

# Irshad Ali Sheikh

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## OFFICE ADDRESS

Department of Pediatrics,  
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## EDUCATION

Ph.D. Biotechnology  
M.Sc. Microbiology  
B.Sc. Microbiology

University of Calcutta, 11<sup>th</sup> July 2017  
University of Calcutta, 1<sup>st</sup> August 2009  
University of Calcutta, 23<sup>rd</sup> July 2007

## EMPLOYMENT HISTORY

Postdoctoral Research Associate I  
Research Scientist III

University of Arizona, 29th August 2016 – 18th April 2021  
University of Arizona, 19th April - present

## RESEARCH INTEREST

My graduate research work focused on the understanding of the signaling mechanism underlying the roles of ion channels and transporters and how dysfunction of these membrane proteins and the tight junction barrier disruption contributes to various gastrointestinal diseases, especially IBD and diarrhea. My Ph.D. project showed that a specific activation of Ca<sup>2+</sup> activated K<sup>+</sup> channel (KCNN4c channel) is required to sustain Cl<sup>-</sup> secretion and targeting this apical KCNN4c channel could provide a novel option to combat secretory diarrhea with oral rehydration solution therapy.

My current research is focused on understanding the mechanisms underlying PARP1<sup>-/-</sup> mice's protection from experimental colitis. I am particularly interested in how intestinal gut microbiota influences PARylation, which is mediated by PARP1, and how this affects the development of inflammatory bowel disease. Apart from this project, I am presently also investigating the functional significance of Na<sup>+</sup>/Ca<sup>2+</sup> exchangers (NCXs) in a special type of extracellular vesicles called matrix vesicles. These vesicles are small (100-300nm) membrane-enclosed structures released by mineralizing osteoblasts and are critical for the initial seeding site for hydroxyapatite and bone formation. During chronic inflammatory conditions such as IBD, reduced NCX3 expression leads to a reduced release of less mineralization-competent matrix vesicles, which likely contributes to the development of inflammation-associated osteoporosis.

Overall, the ultimate goal of my research is to apply the new knowledge gained from basic science to the needs of clinical medicine by translating the information about the mechanisms of ion transporter activation and function from bench to the bedside, particularly by identifying suitable molecular targets for future therapies to cure diseases like IBD, diarrhea, and IBD-associated osteoporosis.

## HONORS & ACHIEVEMENTS

- Awarded travel grant for presenting my research work "**Mineralization-competent osteoblasts require NCX3 for Ca<sup>2+</sup> entry into matrix vesicles**" at 2<sup>nd</sup> International Conference on Matrix Vesicles held on 14<sup>th</sup> June 2019 at Lyon, France.
- Awarded with certificate for **Young Investigator from India and Southeast Asia** by Bill & Melinda Gates Foundation at 17<sup>th</sup> International Congress on Infectious Diseases between 2-5<sup>th</sup> March 2016 at Hyderabad, India.

- Awarded with certificate for participating as one of the candidates for **Young Investigator Award** for my work “Epac1 control intestinal epithelial barrier function by regulating JAM-A trafficking via RAP2C-TNFK signaling pathway” at Asian Pacific Digestive Week (APDW) held between 22-25th November 2014 at Bali, Indonesia.
- **Invited Reviewer of Life Sciences** (Peer review journal publish by Elsevier) ~ 50 manuscripts reviewed until now

## PROFESSIONAL ASSOCIATIONS

- Life Member- Indian Science Congress Association
- Editorial Board Member- Biochemistry and Cell Biology
- Editorial Board Member- Cell Biology

## PUBLICATION

(i) **Sheikh IA**, Kiela PR, Ghishan FK. Isolation of In Vitro Osteoblastic-Derived Matrix Vesicles by Ultracentrifugation and Cell-Free Mineralization Assay. (2025). **Bio-protocol (IF 1.5)**

(ii) Bernardazzi C, Saha T, Gurney MA, Laubitz D, Dey PD, Masannat T, **Sheikh IA**, Midura-Kiela MT, Ghishan FK, Kiela PR. NHE3 Controls Proliferation and Migration of Colonic Epithelial Cells. (2025). **Inflammatory Bowel Diseases (IF 4.5)**

(iii) **Sheikh IA**, Bianchi-Smak J, Laubitz D, Schiro G, Midura-Kiela MT, Besselsen DG, Vedantam G, Jarmakiewicz S, Filip R, Ghishan FK, Gao N, Kiela PR. Transplant of microbiota from Crohn's disease patients to germ-free mice results in colitis. (2024). **Gut Microbes** Jan-Dec; 16(1) **(IF 12.2)**

(iv) **Sheikh IA**, Midura-Kiela MT, Herchuelz A, Sokolow S, Kiela PR, Ghishan FK. The Na<sup>+</sup>/Ca<sup>2+</sup> exchanger NCX3 mediates Ca<sup>2+</sup> entry into matrix vesicles to facilitate initial steps of mineralization in osteoblasts. (2024). **J Extracell Vesicles** Jun; 13(6) **(IF 16)**

(v) Bernardazzi C, **Sheikh IA**, Xu H, Ghishan FK. The Physiological Function and Potential Role of the Ubiquitous Na<sup>+</sup>/H<sup>+</sup> Exchanger Isoform 8 (NHE8): An Overview Data. (2022). **International Journal of Molecular Sciences. (IF 6.2)**

(vi) **Sheikh IA**, Midura-Kiela M, Bernardazzi C, Laubitz D, Filip R, Ghishan FK, Kiela PR. Gut microbiota modulates PARP1-driven Parylation to control colonic inflammation. (2022) **Gastroenterology** 162 (7), S-106. **(IF 22.68)**

(vii) Hoque KM, Hayashi M, **Sheikh IA**, Banerjee A, Verma SC, Leblanc N, Zeiss CJ, Ameen N, Chakraborty S. Elevated 5-hydroxytryptamine in COVID-19 Stimulates ANO1 Mediated Cl Secretion in Lung & Intestinal Epithelial Cells. (2022) **The FASEB Journal** Vol 36 **(IF 5.83)**

(viii) Saha T, Aoun J, Hayashi M, **Ali SI**, Sarkar P, Bag PK, Leblanc N, Ameen N, Woodward OM, Hoque KM. Intestinal TMEM16A control luminal chloride secretion in a NHERF1 dependent manner. (2021). **Biochem Biophys Rep. 2021 Jan 22;25:100912. (IF 1.65)**

(ix) Sarkar P, Saha T, **Sheikh IA**, Chakraborty S, Aoun J, Chakrabarti MK, Rajendran VM, Ameen NA, Dutta S, Hoque KM. Zinc ameliorates intestinal barrier dysfunctions in shigellosis by reinstating claudin-2 and -4 on the membranes (2019). **Am J Physiol Gastrointest Liver Physiol. 316(2):G229-G246 (IF 3.29)**

(x) Aoun J, Hayashi M, **Sheikh IA**, Sarkar P, Saha T, Ghosh P, Bhowmick R, Ghosh D, Chatterjee T, Chakrabarti P, Chakrabarti MK, Hoque KM. Anoctamin 6 Contributes to Cl<sup>-</sup> Secretion in Accessory Cholera Enterotoxin (Ace) Stimulated Diarrhea: A PIP2 Signaling Mechanism for Cholera (2016). *J Biol Chem.* **291(52):26816-26836 (IF 4.77)**

(xi) Sarwar S., Chakraborti S., Bera S., **Sheikh IA.**, Hoque KM., Chakrabarti P. The antimicrobial activity of ZnO nanoparticles against *Vibrio cholerae*: Variation in response depends on biotype (2016). *Nanomedicine: Nanotechnology, Biology and Medicine.* **12(6), 1499-509 (IF 6.1)**

(xii) Chatterjee T, **Sheikh IA**, Chakravarty D, Chakrabarti P, Sarkar P, Saha T, Chakrabarti MK, Hoque KM. Effects of small molecule calcium-activated chloride channel inhibitors on structure and function of Accessory cholera enterotoxin (Ace) of *Vibrio cholera* (2015) *PLoS One.* **10(11), e0141283 (IF 3.2)**

(xiii) **Sheikh IA**, Koley H, Chakrabarti MK, Hoque KM. The Epac1 Signaling Pathway Regulates Cl<sup>-</sup> Secretion via Modulation of Apical KCNN4c Channels in Diarrhea (2013). *J Biol Chem.* **288(28), 20404–20415 (IF 4.77)**

(xiv) Hoque KM, Chakraborty S., **Sheikh IA** and Woodward, W. New advances in the Pathophysiology of enteric infections and their impact on therapy (2012). *Expert Rev Anti Infect Ther.* **10(6), 75-87. (IF 3.28)**

(xv) **Sheikh IA**, Chatterjee, T Hayashi, M Saha, DR, Chakrabarti P., Chakrabarti, MK and Hoque KM. Recombinant Accessory Cholera Enterotoxin (ACE) of *Vibrio Cholera* Induces Diarrhea by Stimulation of a Chloride Channel and Inhibition of the Na<sup>+</sup>/Glucose Co-Transporter SGLT1 (2014). *Gastroenterology* **146(5), S1, S-652**

(xvi) **Sheikh IA**, Sarkar P., Saha T., Aoun J., and Hoque KM. Epac1 control intestinal epithelial barrier function by regulating JAM-A trafficking via RAP2C-TN1K signaling pathway (2014). *J Gastroenterol Hepatol*, **29(S3), 47**

#### BOOK CHAPTERS

- **Sheikh IA**, Ammourey R, Ghishan FK. Pathophysiology of Diarrhea and Its Clinical Implications. In: *Physiology of the Gastrointestinal Tract*. 6th Ed. March 2018, Academic Press (H. Said, F.K. Ghishan, J. Kaunitz, J. Merchant, J.D. Wood, Editors). (textbook chapter)

#### SEMINARS & SYMPOSIA

(i) Poster presented at 46th annual meeting of the United States and Japanese Panels on Cholera and Other Bacterial Enteric Infections held at Hyatt Regency Kolkata on 13th December 2011.

(ii) Awarded with certificate for participating in “Molecular Modelling and Drug Designing” workshop organized by Biomedical Informatics Centre of National Institute of Cholera & Enteric Diseases, Kolkata on 12<sup>th</sup> and 13<sup>th</sup> April, 2012.

(iii) Awarded with certificate for participating in “Electron Microscopic Technique: Holey film, Carbon film and Ultramicrotomy” workshop organized by National Institute of Cholera & Enteric Diseases, Kolkata on 30th July, 2012.

(iv) Poster presented at 100<sup>th</sup> Indian Science Congress held between 3rd-7th January 2013 at Kolkata.

(v) Awarded with certificate for participating as one of the candidates for **Young Investigator Award** for my work “Epac1 control intestinal epithelial barrier function by regulating JAM-A trafficking via RAP2C-TN1K signaling pathway” at Asian Pacific Digestive Week (APDW) held between 22-25th November 2014 at Bali, Indonesia.

**(vi)** Awarded with certificate for participating as one of the candidates for **Young Investigator Award** for my work “*Vibrio cholerae* ACE toxin impaired intestinal ion transport by activating ANO6 and inhibiting SGLT1 co-transporter to cause diarrhea” at 102<sup>nd</sup> Session of Indian Science Congress held between 3-7<sup>th</sup> January 2015 at Mumbai, India.

**(vii)** Poster entitled as “Mineralization-competent osteoblasts require NCX3 for Ca<sup>2+</sup> entry into matrix vesicles” presented at 2nd International Conference On Matrix Vesicles : From Biochemistry To Clinic held on 14th June 2019 at Lyon, France.

**(viii)** Oral presentation for my work “Gut microbiota modulates PARP1-driven Parylation to control colonic inflammation” at Digestive Disease Week held between 21–24<sup>th</sup> May 2022 at San Diego, USA.

**(ix)** Plenary session talk for my work “PARP1 is a novel regulator of Paneth cell degranulation and intestinal antimicrobial defense against enteric pathogen” at Digestive Disease Week held between 3rd-6th May 2025 at San Diego, USA.